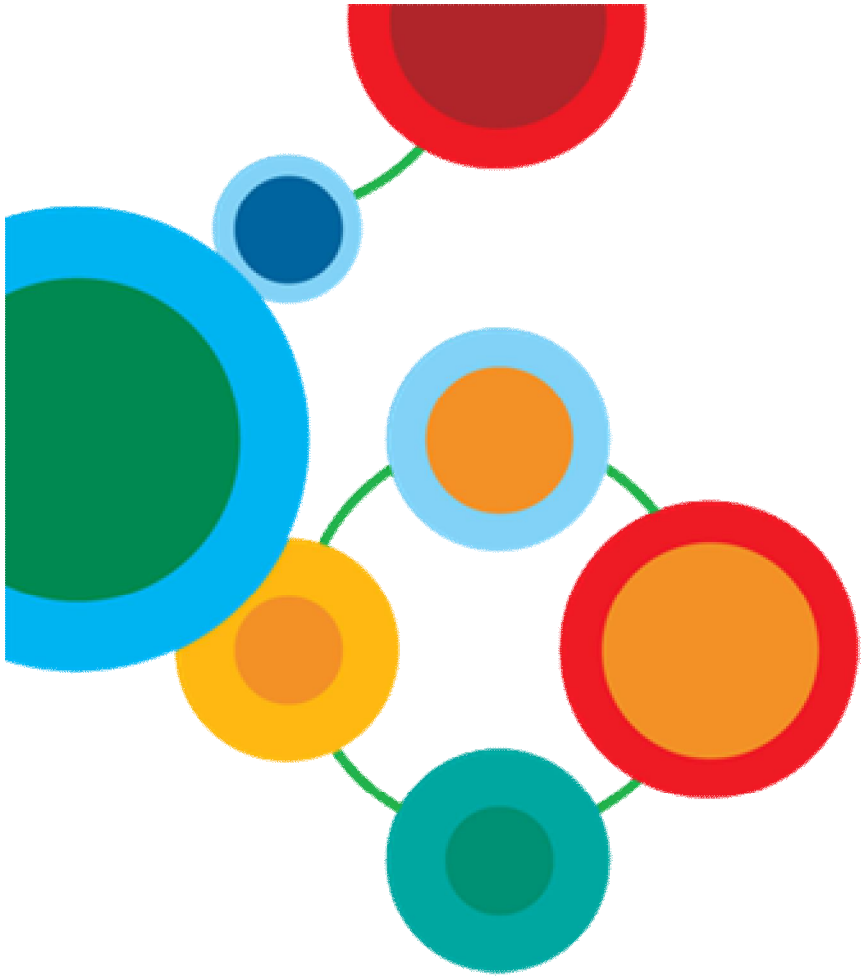


IMS Performance Update

IMS

Kevin Hite, IBM
khite@us.ibm.com

Please Note:

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion.

Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision.

The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

Acknowledgements and Disclaimers:

Availability. References in this presentation to IBM products, programs, or services do not imply that they will be available in all countries in which IBM operates.

The workshops, sessions and materials have been prepared by IBM or the session speakers and reflect their own views. They are provided for informational purposes only, and are neither intended to, nor shall have the effect of being, legal or other guidance or advice to any participant. While efforts were made to verify the completeness and accuracy of the information contained in this presentation, it is provided AS-IS without warranty of any kind, express or implied. IBM shall not be responsible for any damages arising out of the use of, or otherwise related to, this presentation or any other materials. Nothing contained in this presentation is intended to, nor shall have the effect of, creating any warranties or representations from IBM or its suppliers or licensors, or altering the terms and conditions of the applicable license agreement governing the use of IBM software.

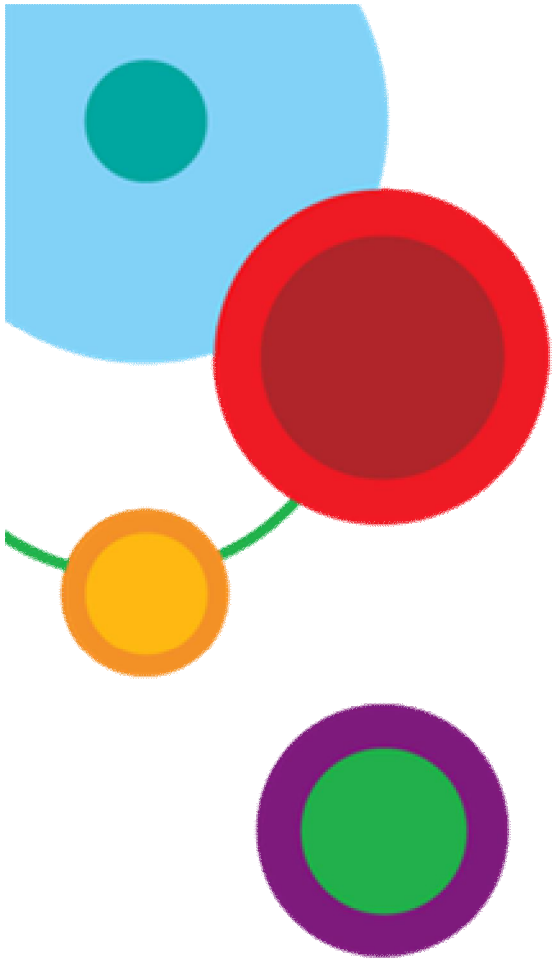
All customer examples described are presented as illustrations of how those customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics may vary by customer. Nothing contained in these materials is intended to, nor shall have the effect of, stating or implying that any activities undertaken by you will result in any specific sales, revenue growth or other results.

IBM, the IBM logo, ibm.com, Information Management, IMS, CICS, WebSphere Application Server and z/OS are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both. If these and other IBM trademarked terms are marked on their first occurrence in this information with a trademark symbol (® or ™), these symbols indicate U.S. registered or common law trademarks owned by IBM at the time this information was published. Such trademarks may also be registered or common law trademarks in other countries. A current list of IBM trademarks is available on the Web at “Copyright and trademark information” at www.ibm.com/legal/copytrade.shtml

Other company, product, or service names may be trademarks or service marks of others.

Agenda:

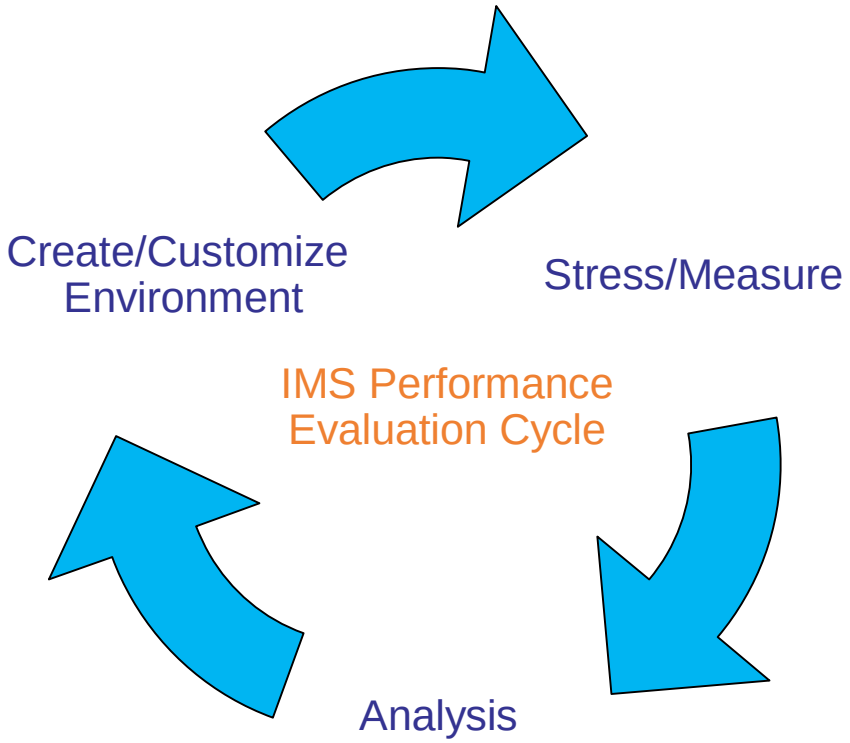
- Performance Evaluation Process & Environment
- IMS Version 12 Base Performance Evaluations
- IMS Version 12 Performance Evaluations: New functions and Enhancements
- Performance Evaluation Highlights



Performance Evaluation Process & Environment

Performance Evaluation Methodology

- Comparison method
- Repetitive process
- Stable & isolated environment
- Internal Throughput Rate (ITR)*



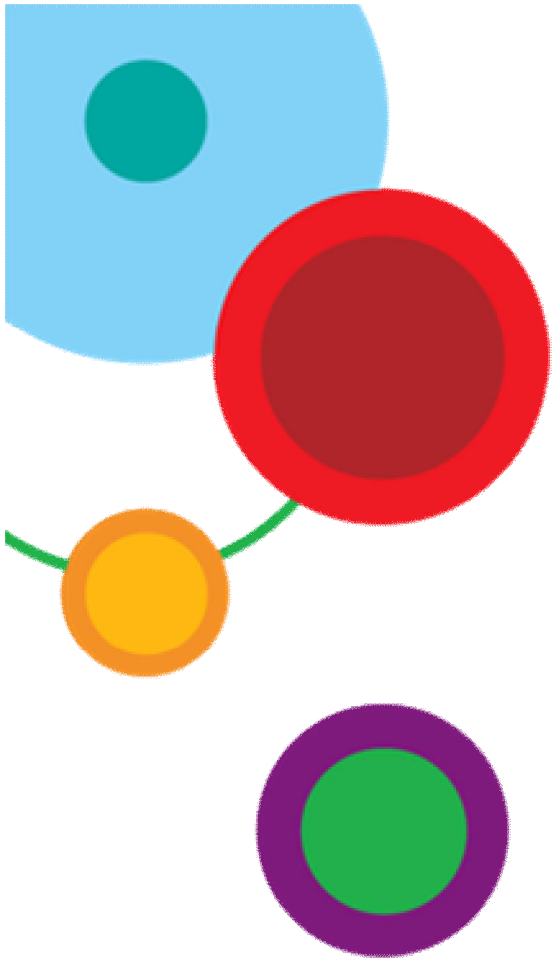
*ITR (Internal Throughput Rate) is a measure of CPU efficiency and is calculated by dividing the transaction rate measured by the CPU consumed.

Performance Environment

- Processor
  - IBM System z10 Enterprise Class (2097 E64)
  - IBM zEnterprise System z196 (2817)
- DASD 8300 & 8700 FICON Channels
- Internal CFs, CFCC Levels 15 & 16
- VTAM and CTC ESCON channel speed = 17 MB/sec
  - (CTC FICON 60-170 MB/sec)
- TCP/IP OSA card speed = 128 MB/sec (1 Gb/sec)
- Workloads include Full Function Warehouse, Fast Path Banking, and BMP workloads

IBM System z10 Enterprise Class (2097 E64)

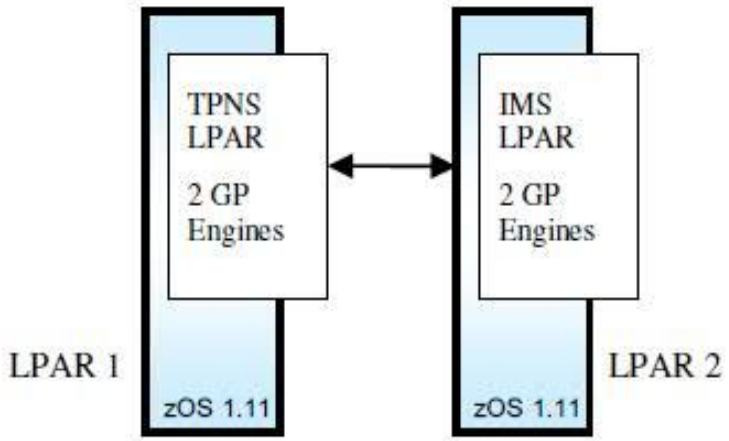
IBM zEnterprise System z196 (2817)



IMS Version 12 Base Performance Evaluations

IMS Version 12 Base Performance Evaluations - Fast Path Base Evaluation

- z10 - 2 two way sysplex environment with 2 General Purpose engines each
- Single Image IMS on 1 dedicated LPAR with TPNS on its own dedicated LPAR
- TPNS simulating 4,000 clients

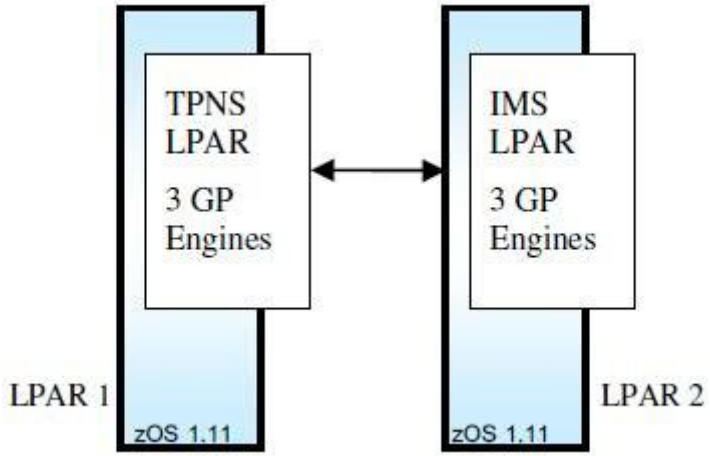


IMS Version 12 Base Performance Evaluations - Fast Path Base Evaluation

- The results of the ITR comparison between IMS V11 and IMS V12 demonstrate the latest IMS release maintains its current performance and CPU efficiency
- IMS V11 FPB64=N vs. IMS V12 FPB64=N comparisons show a 1.9% reduction in ITR for IMS V12
- IMS V12 FPB64=Y show an increased ITR of <1%
  - Functional enhancement made to the FPB64=Y to optionally allow subpool expansion/compression

IMS Version 12 Base Performance Evaluations - Full Function with HALDB Base Evaluation

- 2 LPARS with 3 General Purpose engines each
- Single Image IMS on 1 dedicated LPAR with TPNS on its own dedicated LPAR
- TPNS simulating 4,000 clients
- DS8000 model 8700 DASD connected via 8 FICON channel paths



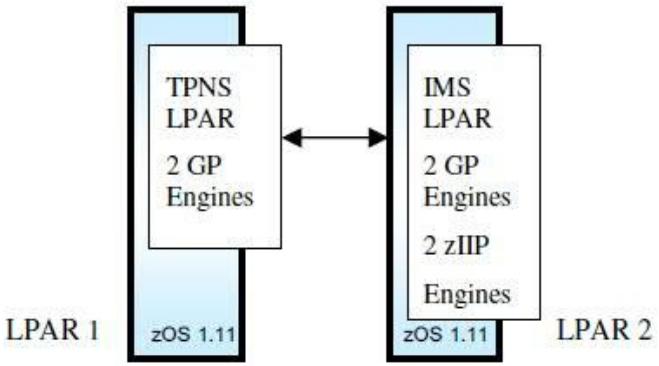
IMS Version 12 Base Performance Evaluations - Full Function with HALDB Evaluation

- The results show that the Internal Throughput Rate (ITR) comparisons of the IMS Version 11 and IMS Version 12 Full Function with HALDB workload demonstrate equal or better performance for the IMS V12 environment

Full Function Base Evaluation				
	IMS V11	**IMS V12**	**Delta**	**Delta %**
ETR (Tran/Sec)	1,543.43	1,548.26	4.83	0.31%
CPU%	82.47%	82.61%	0.14	0.17%
ITR (Tran/Sec)	1,871.43	1874.10	2.68	.14% Improvement

IMS Version 12 Base Performance Evaluations - Full Function HALDB Shared Message Queues (SMQ) Base Evaluation

- 2 LPARS with 2 General Purpose engines each and 2 zIIP processors on the IMS LPAR
  - With IMS V12 and subsequent releases, IMS SMQ or Shared IMS Fast Path Message Queues environments can processes eligible work on System Z Integrated Information Processors (zIIP)
- Single Image IMS on 1 dedicated LPAR with TPNS on its own dedicated LPAR
- TPNS simulating 4,000 clients
- DS8000 model 8700 DASD connected via 8 FICON channel Paths



IMS Version 12 Base Performance Evaluations - Full Function HALDB Shared Message Queues (SMQ) Base Evaluation

- The results show that the Internal Throughput Rate (ITR) comparison of the IMS V11 and IMS V12 Full Function HALDB SMQ workload demonstrate minimal improvement for IMS V12

Full Function SMQ Base Evaluation				
	IMS V11	**IMS V12**	**Delta**	**Delta %**
ETR (Tran/Sec)	1028.69	1031.91	3.22	0.31%
CPU%	80.64%	80.85%	0.21	0.26%
zIIP%	4.23%	5.39%	1.16	27.42%
ITR (Tran/Sec)	1275.66	1276.33	.67	0.05%

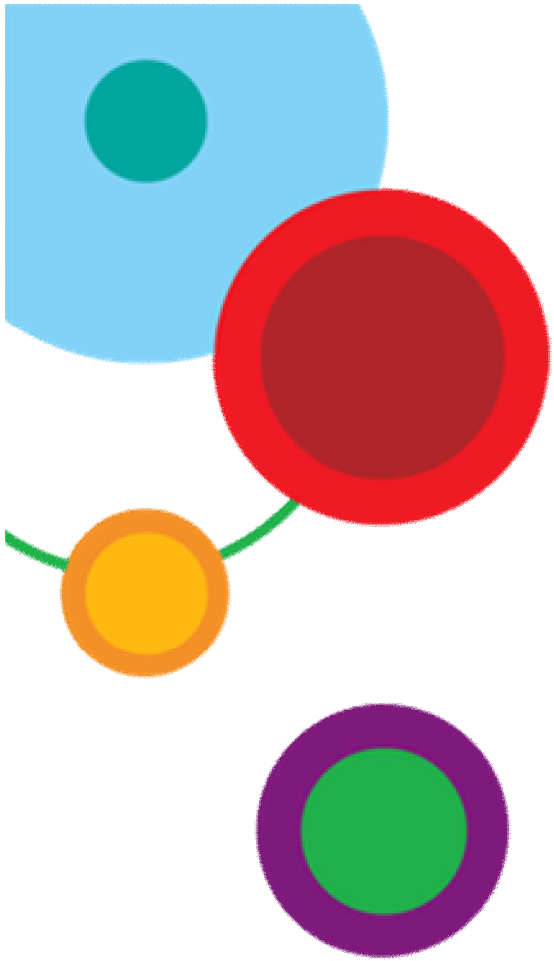
IMS Version 12 Base Performance Evaluations - Banking BMP Base Evaluation

- The goals for the Banking BMP base measurements were focused on the total elapsed time required to execute a set of banking like BMPs
- 1 LPARS with 3 General Purpose engines
- Single Image IMS on 1 dedicated LPAR
- DS8000 model 8700 DASD connected via 8 FICON channel Paths

IMS Version 12 Base Performance Evaluations - Banking BMP Base Evaluation

- The results of the Banking BMP comparison between IMS V11 and IMS V12 demonstrate the latest IMS release maintains its current performance and CPU efficiency

	Elapsed Time (sec)	CPU Busy %	EXCP #	CSA Below 16MB Key 7	Task CPU Time	ECSA Above 16MB Key 7
IMS V11	76	7.88	41	204K	7.39	49.5M
IMS V12	78	7.69	42	208K	7.39	49.5M



Performance Evaluations:

IMS Version 12 Enhanced Logger with 64 bit Buffering

IMS Version 12 Enhanced Logger with 64 bit Buffering

- Online and System Log Data Sets are now enhanced to allow
  - the IMS log buffer storage to move above the 2 gigabyte boundary by utilizing 64 bit buffering
  - the IMS log data sets to be striped

IMS Version 12 Enhanced Logger with 64 bit Buffering

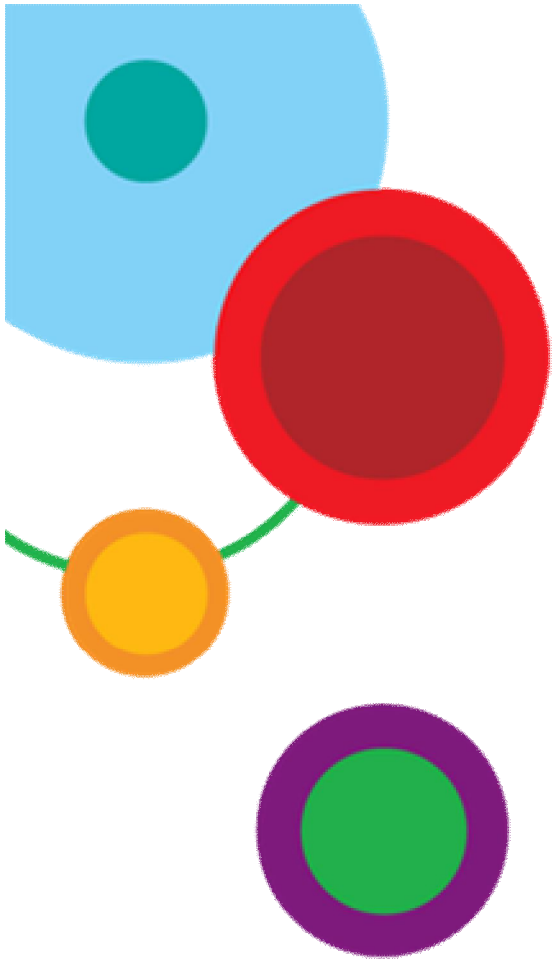
OLDS Logging Using Sequential Access Method (SAM) Striping (74KB Log Data Size) on DS8700

Scenario	Transaction Rate (Tran/sec)	PA OLDS (Writes/sec)
No Stripes	2133	154 MB/sec
2 Stripes	3162	228 MB/sec
4 Stripes	3825	277 MB/sec
6 Stripes	4536	329 MB/sec
8 Stripes	4908	354 MB/sec

Side Note:
DASD Type 8700 provides 1/3 logging rate improvement over the 8300 DASD type

IMS Version 12 Enhanced Logger with 64 bit Buffering

- Using a sample workload generating 74KB per transaction, SAM striping helps V12 logging bandwidth
- 354 MB/sec IMS V12 OLDS logging rate was achieved using SAM striping (8 stripes with 74KB log data size per transaction)
- The ECSA Virtual Storage Constraint Relief, (VSCR) with 2,516 64-bit log buffers was 64MB
- 35% logging rate improvement was observed using DS8700 vs DS8300 volumes (DS8300 4-stripe, 74KB log data size setup achieved a logging rate of 205MB/sec)



Performance Evaluations:
IMS Version 12 Logging WADS Enhancement

IMS Version 12 Logger Enhancements - WADS

- New WADS Channel Program now conforms to E-C-K-D architecture providing greater efficiency and reduces channel program operations

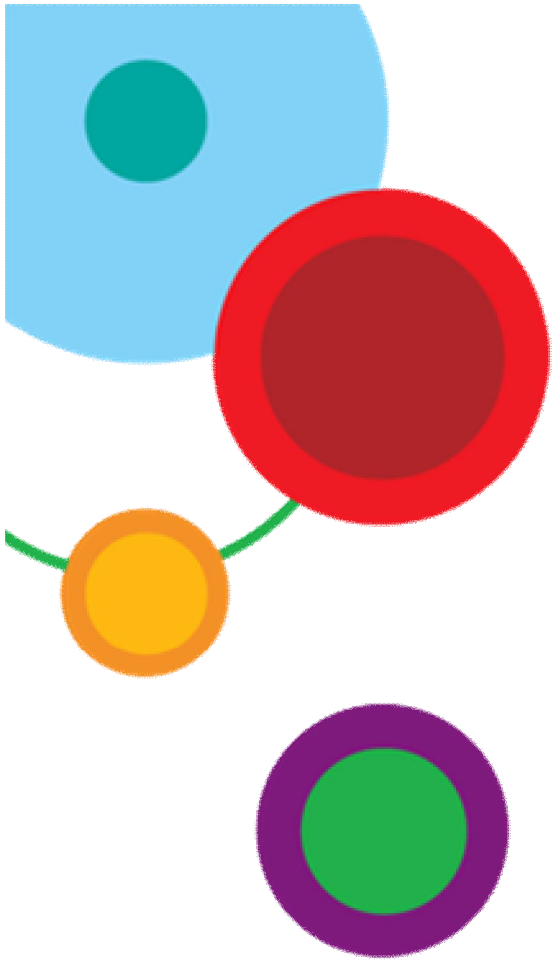
IMS V11 (top) & IMS V12 (Bottom)

STORAGE GROUP	DEV NUM	DEVICE TYPE	NUMBER OF CYL	VOLUME SERIAL	PAV	LCU	DEVICE ACTIVITY RATE	AVG RESP TIME	AVG IOSQ TIME	AVG CMR DLY	AVG DB DLY	AVG PEND TIME	AVG DISC TIME	AVG CONN TIME	% DEV CONN	% DEV UTIL	% DEV RESV	AVG NUMBER ALLOC	% ANY ALLOC	% MT PEND
	240D	33909	31164	S24$0D	1.0H	0023	1143.49	.384	.000	.025	.000	.179	.001	.204	23.32	23.42	0.0	1.0	100.0	0.0
	240D	33909	31164	S24$0D	1.0H	0023	1163.02	.344	.000	.028	.000	.184	.001	.159	18.47	18.60	0.0	1.0	100.0	0.0

	IMS Version 11	IMS Version 12
WADS AVG RespTime	.384	.344
% Improvement (Resp Time)	--	10.41%

WADS Response Time comparison table

- Note: This improvement is expected to have a significant positive impact on global and metro mirroring



Performance Evaluations:

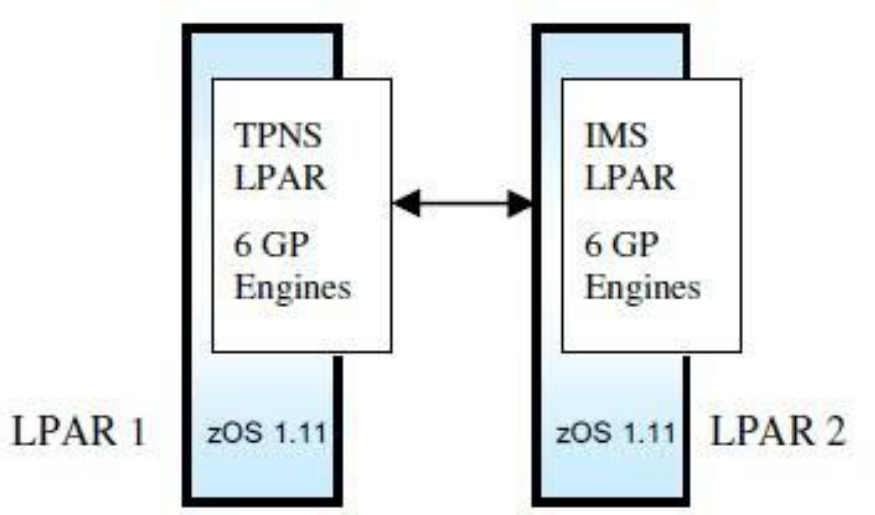
IMS Version 12 Fast Path 64 Bit Buffer Manager Enhancement

IMS Version 12 Fast Path 64 Bit Buffer Manager Enhancement

- IMS V12 enhancement to the Fast Path 64 bit buffer manager introduces
  - subpool expansion and compression
  - reduced ECSA usage
  - code length reduction and removal
  - enhanced QUERY POOL command improving both performance and manageability
- IMS Fast Path subpools are expanded prior to wait-for-buffer conditions
- IMS Fast Path subpools are compressed when the storage is no longer needed

IMS Version 12 Fast Path 64 Bit Buffer Manager Enhancement

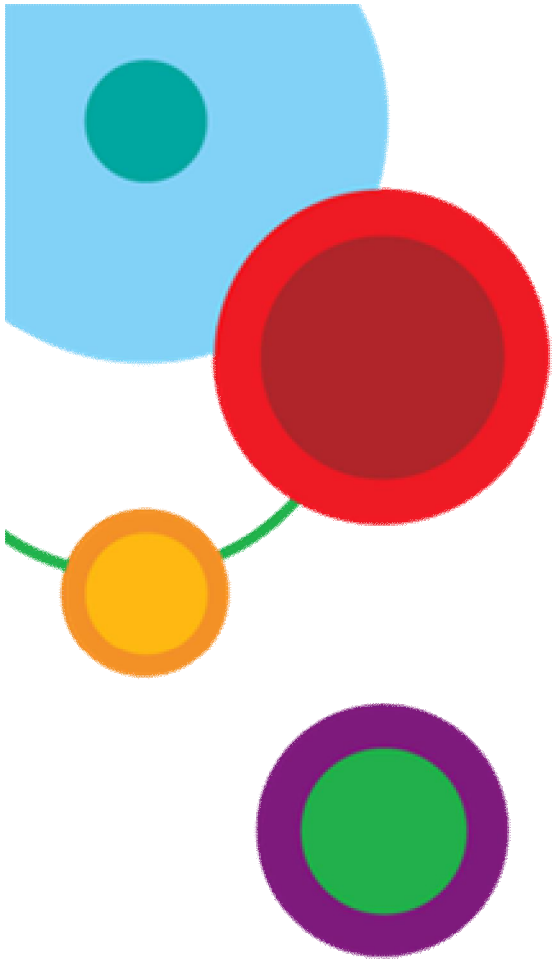
- Fast Path Banking Workload
- 2 LPARS with 6 General Purpose engines each
- Single Image IMS on 1 dedicated LPAR with TPNS on its own dedicated LPAR
- DS8000 model 8700 DASD connected via 8 FICON channel Paths



IMS Version 12 Fast Path 64 Bit Buffer Manager Enhancement

- Observations
  - As workload requirement for FP Buffers increased the total number of FP Buffers in the pool expanded
  - As workload requirement for FP Buffers decreased the total number of FP Buffers in the pool compressed
  - Total ECSA requirements adjusted as workload requirements adjusted.

Time	Event	Transactions Rate/Sec	Total # of Buffers	Total ECSA Usage
08:24:30	3K Clients Executing	9,025	536	747K
08:24:33	Open 1K More Clients			
08:24:33	4K Clients Executing	12,380	1,406	1279K
08:27:35	Close All Clients			
08:37:42	Clients are Quiescing	3,018	1,290	1279K
09:00:17	All Clients are stopped	0	1,000	1092K



Performance Evaluations:
IMS V12 DRD with RDDS and Repository

IMS V12 DRD with RDDS and Repository

- IMS Repository support for selected DRD resources (transactions, routing codes, program directories, database directories, and descriptors for these) provides a single centralized store for resource definitions in an IMSplex
- IMS Repository simplifies the management of resource definitions and eliminates manual import and the multiple Resource Definition Data Sets (RDDS) for each IMS

IMS V12 DRD with RDDS and Repository

- RDDS vs. Repository for a single image IMS
  - –Measurements compare RDDS vs. Repository for IMPORT and EXPORT commands for 135,000 resource definitions for a Single IMS
  - –AUTOIMPORT +1 minute
  - –IMPORT command +1 minute
  - –EXPORT command +16 minutes

DB	15000
DB Index	15000
PGM Batch	
PGM TP	30000
TRAN	60000
RTCODE	15000
Total Resources	135000

IMS Version 12 RDDS vs Repository (REPO) with 135K definitions			
	RDDS	REPO	Delta
EXPORT CMD	00:00.54	15:55.41	15:54.87
IMPORT CMD	25:21.82	26:40.19	01:18.37
AUTOIMPORT	01:09.96	02:19.36	01:19.40

RDDS vs Repository Single Image Analysis

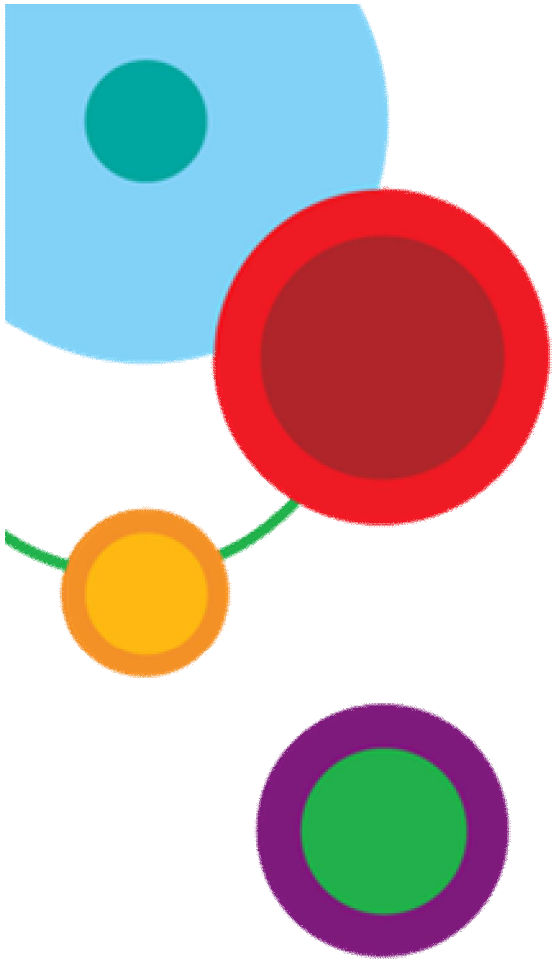
IMS V12 DRD with RDDS and Repository

- Comparison of elapsed time for a Repository AUTOIMPORT of 135,000 resource definitions to a 3 way IMS system

3 Way IMS Version 12 Sysplex Repository AUTOIMPORT with 135k definitions			
	Start command issued at same time for all 3 IMS regions		
	IMS 1	IMS 2	IMS 3
Start Time	11:12:17.14	11:12:17.14	11:10:08.92
End Time	11:15:49.37	11:15:49.52	11:13:28.96
Elapsed Time (individual)	3 min 32 sec	3 min 32 sec	3 min 20 sec

IMS V12 DRD with RDDS and Repository

- Observations
  - The IMS V12 AUTOIMPORT into the IMS Repository took roughly 1 minute longer than the AUTOIMPORT time with IMS V11 RDDS
  - The IMS V12 IMPORT into the IMS Repository took roughly 1 minute longer than the IMPORT time with IMS V11 RDDS
  - IMS V12 EXPORT elapsed time in comparison to IMS V11 was roughly 16 minutes longer
  - Users should find that the manageability aspects of the Repository outweigh the increase in total elapsed time for these commands



Performance Evaluations:
IMS Version 12 Full Function Dynamic Buffer Pool

IMS Version 12 Full Function Dynamic Buffer Pool

- New IMS online commands are provided to dynamically managing (add, change, and delete) Full Function database OSAM and VSAM buffer pools without taking the system down
- As transaction volume grows, the number of I/Os would be increased; but if the buffer pool size is increased, less I/Os are needed

IMS Version 12 Full Function Dynamic Buffer Pool

- Two scenarios were used to evaluate the impact of issuing the UPDATE POOL command
  - Single Image IMS Full Function workload with 128 MPP regions at approximately 850 transactions/sec
  - Single Image IMS Full Function workload with 128 MPP regions and 4 BMPs at approximately 850 transactions/sec

IMS Version 12 Full Function Dynamic Buffer Pool

- UPD POOL for OSAM vs VSAM vs a combination of OSAM & VSAM in the same run with Full Function workload

Single Image IMS Full Function workload with 128 MPP regions			
	OSAM	VSAM	OSAM & VSAM
Tran Rate before UPD POOL	851.3 tx/sec	852.2 tx/sec	852.6 tx/sec
Tran Rate During UPD POOL	846.3 tx/sec	628.1 tx/sec	632.9 tx/sec
Total time to process UPD POOL (sec)	.7 sec	16 sec	.7 sec / 17 sec
CPU busy % Before/During/After UPD	36.2% / 36.2% / 36.2%	36.7% / 29.2% / 37.1%	35.7% / 28.6% / 36.4%
Transit execution time	44 msec	43 msec	41 msec
DBBP latch conflict (OSAM only)	44.8/sec	--	43.5/sec

Full Function Dynamic Buffer Pool Impact Analysis

IMS Version 12 Full Function Dynamic Buffer Pool (BMP)

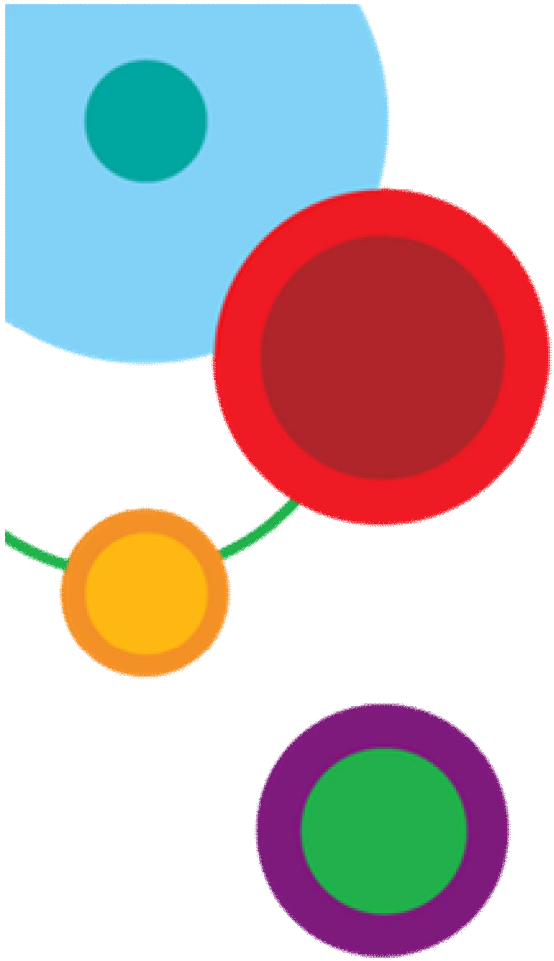
- UPD POOL for OSAM vs VSAM vs a combination of OSAM & VSAM in the same run with 128 MPPs & 4 BMPs

Single Image IMS Full Function workload with 128 MPP regions & 4 BMPs			
	OSAM	VSAM	OSAM & VSAM
Tran Rate before UPD POOL	852.2 tx/sec	852.7 tx/sec	852.6 tx/sec
Tran Rate During UPD POOL	850.1 tx/sec	603.7 tx/sec	605.5 tx/sec
Total time to process UPD POOL (sec)	.7 sec	36 sec	.7 sec / 36 sec
CPU busy % Before/During/After UPD	40.9% / 42.5% / 36.4%	33.5% / 29.4% / 37.4%	41.1% / 22.1% / 37.2%
Transit execution time	42 msec	43 msec	43 msec
DBBP latch conflict (OSAM only)	43.9/sec	--	42.5/sec

Full Function Dynamic Buffer Pool with BMPs Impact Analysis

IMS Version 12 Full Function Dynamic Buffer Pool

- For both scenarios we observed
  - Approximately 26%~29% transaction rate impact to the online system during the command execution against the VSAM data base resource pool
  - Approximately 1% transaction rate impact when the command was issued against our OSAM buffer pools
- Even with the impact to the transaction rate, the UPDATE POOL command provides a convenient way make buffer pool changes to your online system depending on your systems demands



Performance Evaluations:

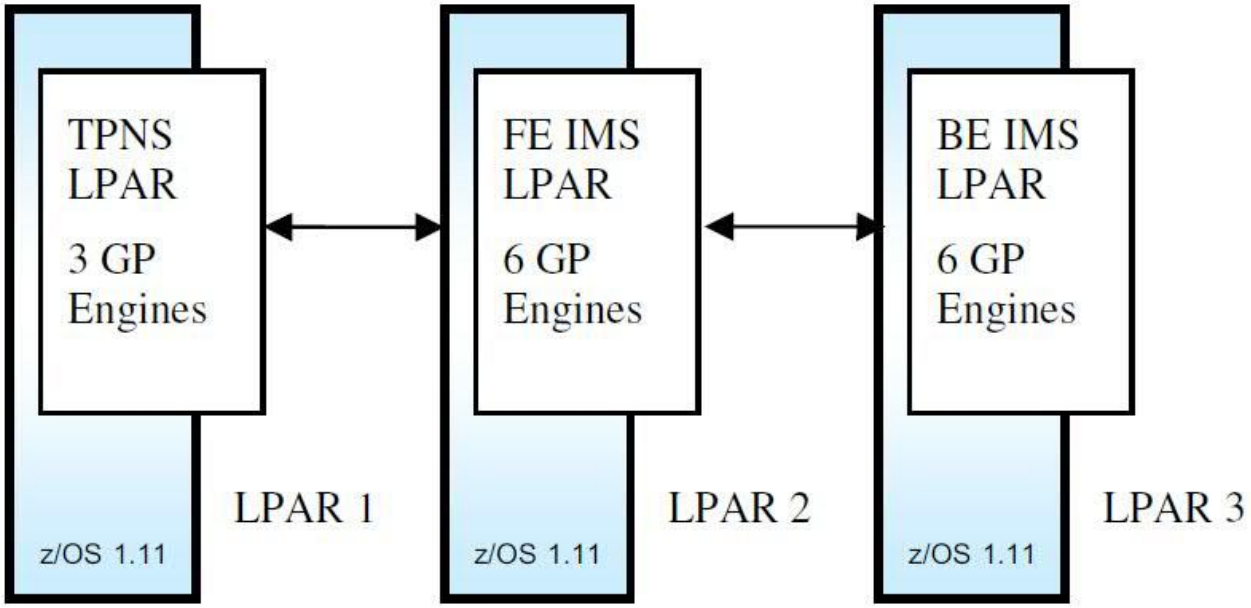
IMS Version 12 Synchronous Shared Queues Enhancement

IMS Version 12 Synchronous Shared Queues Enhancement

- New support for using z/OS® cross-system coupling facility (XCF) for communicating between a front-end IMS and a back-end IMS in a shared-queue group for APPC synchronous conversations or OTMA send-then-commit (CM1) transactions with a synchronization level of NONE or CONFIRM
- In these situations, IMS is the synchronization point manager instead of z/OS Resource Recovery Services (RRS)

IMS Version 12 Synchronous Shared Queues Enhancement

- Both the OTMA and APPC evaluations used three LPARs one for TPNS, one for the Front End (FE) IMS and one for the Back End (BE) IMS



IMS Version 12 Synchronous Shared Queues Enhancement-OTMA

- 63% ITR Path-length improvement For SYNCLVL=NONE using XCFIMS

V12 OTMA Sync. SQ Enhancement (SYNCLVL=NONE)				
	CM1/SL0		Delta	%
	AOS=Y	AOS=X		
ITR	3,910.50	6,375.60	2,465.10	63.04%
FE CPU	37.64%	14.24%	-23.40	-62.18%
BE CPU	91.91%	70.10%	-21.81	-23.74%

RRS (AOS=Y) vs. XCF (AOS=X) ITR Comparison

IMS Version 12 Synchronous Shared Queues Enhancement- OTMA

- 81% ITR Path-length improvement For SYNCLVL=CONFIRM using XCFIMS

V12 OTMA Sync. SQ Enhancement (SYNCLVL=CONFIRM)				
	CM1/SL1		Delta	%
	AOS=Y	AOS=X		
ITR	4,072.24	7,363.85	3,291.62	80.83%
FE CPU	45.04%	20.62%	-24.42	-54.21%
BE CPU	87.00%	65.31%	-21.69	-24.93%

RRS (AOS=Y) vs. XCF (AOS=X) ITR Comparison

IMS Version 12 Synchronous Shared Queues Enhancement - OTMA

- For SYNCLVL=NONE, when splitting the workload between the IMS Front End and Back End, the path-length (ITR) improved by 27%

V12 OTMA Sync. SQ Enhancement (SYNCLVL=NONE) Split				
	CM1/SL0		Delta	%
	AOS=Y	AOS=X		
Total ITR	5,440.74	6,906,66	1,465.92	26.94%
FE CPU	79.64%	68.09%	-11.55	-14.51%
BE CPU	16.68%	10.43%	-6.25	-37.46%

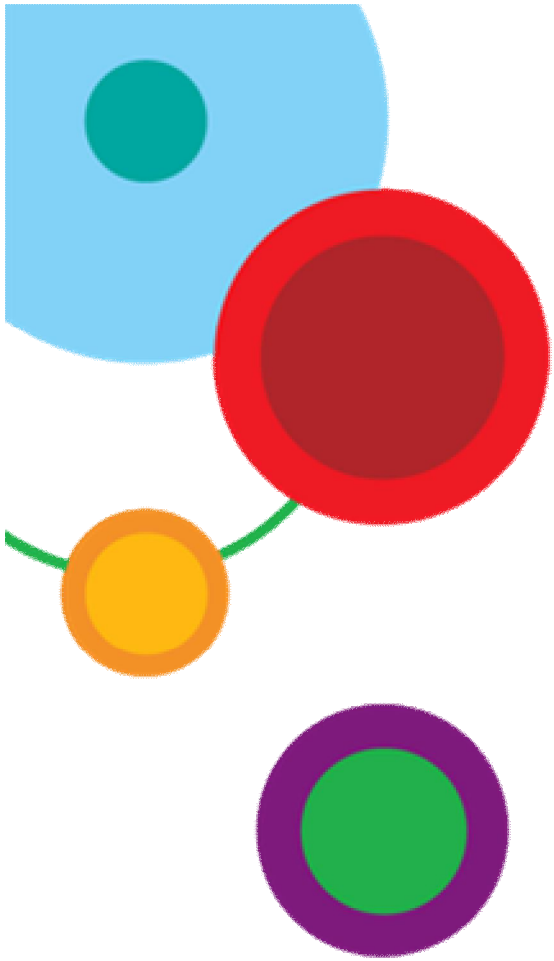
RRS (AOS=Y) vs XCF (AOS=X) ITR Comparison Split

IMS Version 12 Synchronous Shared Queues Enhancement- APPC

- Significant performance gains in the APPC Sync. SMQ enhancements.
- An average of 78% reduction in CPU utilization for BE and FE IMS
- 35% reduction IFP region occupancy demonstrating quicker transaction transit times
  - 8 IFPs used with 57.13% region occupancy for AOS=Y and 42.12% for AOS=B

IMS V12 APPC Synchronous Shared Queues Enhancement			
	AOS=Y	AOS=B	Delta (Delta %)
ETR	1521	1938	417 (21.51%)
ITR	3135.44	7100.20	3964.73 (126.45%)
FE CPU	59.59%	33.66%	-25.93 (-77.03)
BE CPU	37.43%	20.93%	-16.5 (-78.83%)

RRS (AOS=Y) vs APPC (AOS=B) ITR Comparison



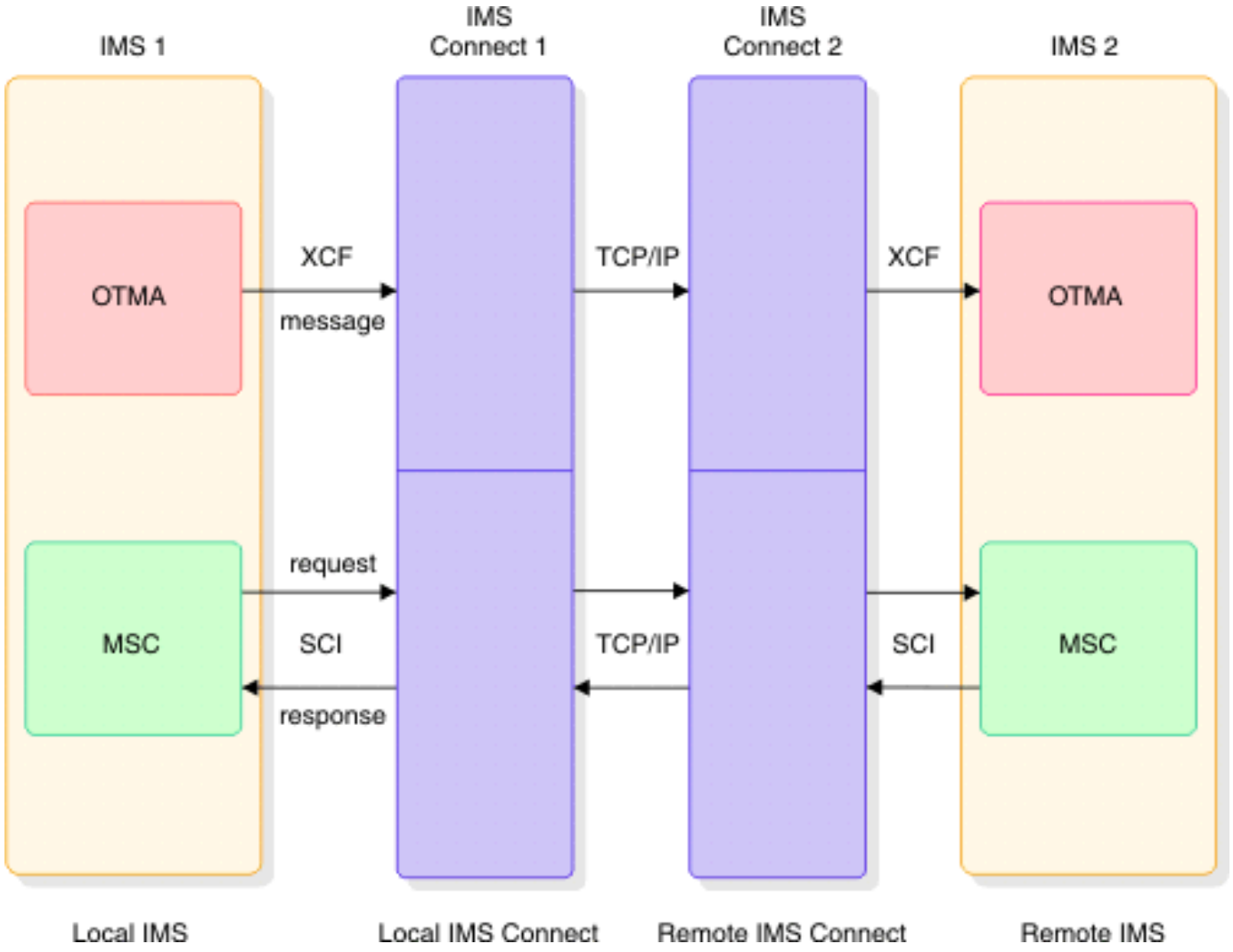
Performance Evaluations:
IMS V12 IMS Connect to IMS Connect Enhancement

IMS V12 IMS Connect to IMS Connect Enhancement

- The IMS™ Connect to IMS Connect function introduces the concept of *IMS-to-IMS TCP/IP communications*: two IMS systems communicating with each other across an Internet Protocol network without the requirement of a third-party application to relay the TCP/IP messages between multiple instances of IMS TCP/IP servers (IMS Connect)

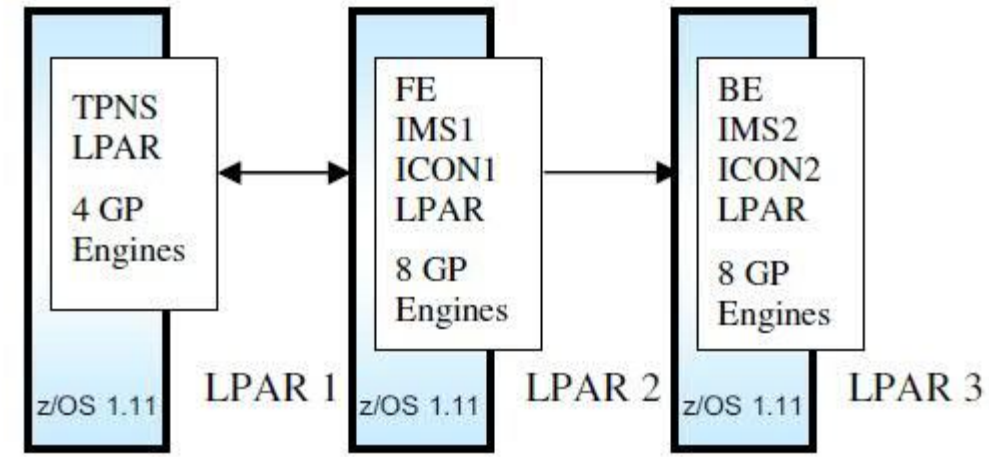
- IMS-to-IMS TCP/IP communications supports both the Multiple Systems Coupling (MSC) and Open Transaction Manager Access (OTMA) components of IMS

IMS V12 IMS Connect to IMS Connect Enhancement



IMS V12 IMS Connect to IMS Connect Enhancement - OTMA

- IMS Connect to IMS Connect OTMA Environment
  - LPAR1 for TPNS (4 GPs)
  - LPAR2 for Front End system with 1 IMS and IMS Connect (8 GPs)
  - LPAR3 for Back End (remote) system with 1 IMS and IMS Connect (8 GPs)



IMS V12 IMS Connect to IMS Connect Enhancement - OTMA

- TPNS drove transactions that issued CHNG and ISRT ALTPCB calls from local application running in 132 MPP regions
- OTMA one-way asynchronous messages distributed among 120 OTMA descriptors to remote site

IMS V12 IMS Connect to IMS Connect Enhancement - OTMA

- IMS Connect to IMS Connect OTMA Results:

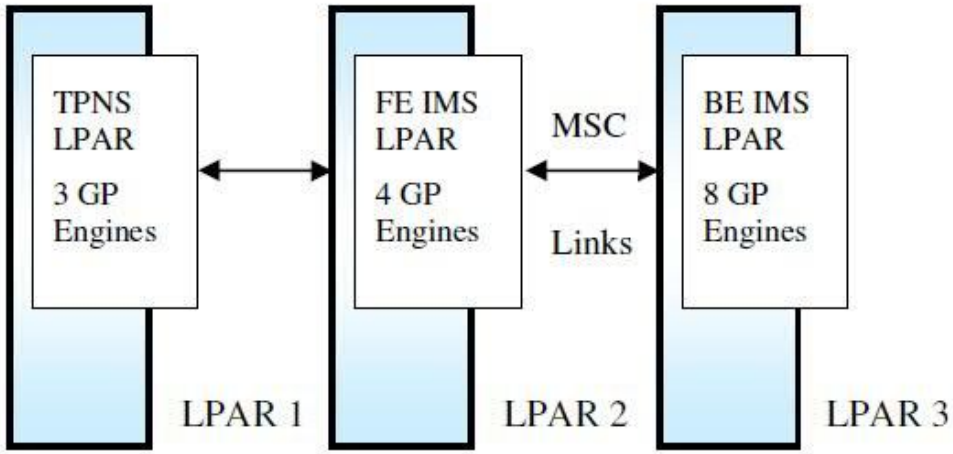
	ICON-ICON OTMA (Send Only)
ETR (sending)	9,570 tx/sec
CPU	81%
ITR (sending)	11,815 tx/sec

IMS Connect to IMS Connect OTMA Benchmark Evaluation

IMS V12 MSC TCP/IP Enhancement

- The benchmark for the MSC TCP/IP evaluation tested an even distribution of transactions across 32 MSC links to compare
  - VTAM Links
  - TCP/IP Links

- Environment
  - 3 GPs for TPNS simulating 8,000 clients
  - 4 GPs for Front-End (FE) IMS with 32 MSC Links (ESCON CTC)
  - 8 GPs for Back-End (BE) IMS with 64 MPP regions, 32 transactions



IMS Version 12 MSC TCPIP Achieves Over 10,500 tx/sec

- Observations
  - Over 10,500 transactions per second achieved with IMS V12 MSC TCPIP

IMS Version 12 MSC TCPIP 16K Buffers (1K message size)	
	TCPIP
ETR	10,587.57
ITR	19,155.22
FE CPU	80.52%
BE CPU	55.27%

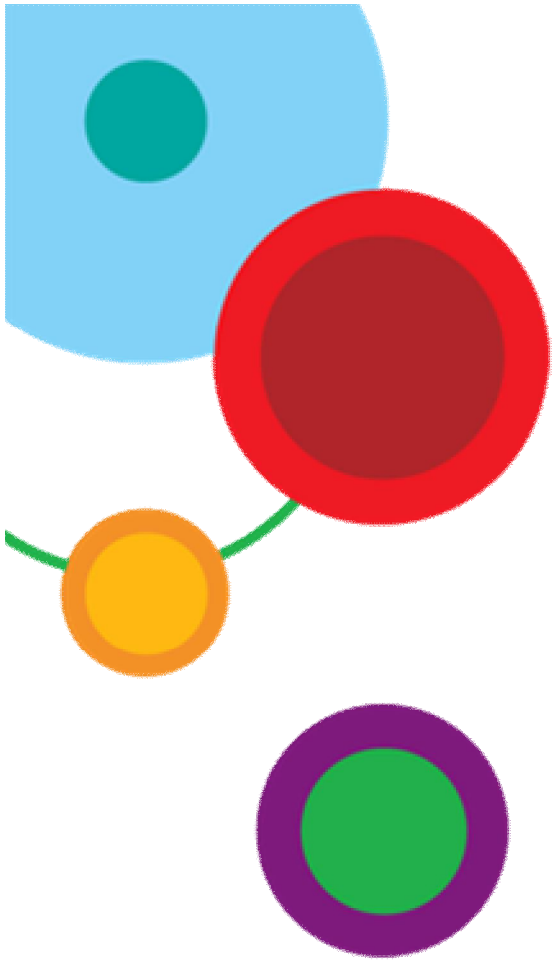
MSC TCPIP Benchmark Evaluation

IMS Version 12 MSC VTAM 16K Buffers (1K message size)	
	VTAM
ETR	9,303.86
ITR	16,070.58
FE CPU	81.14%
BE CPU	57.89%

MSC VTAM Benchmark Evaluation

IMS Version 12 MSC Conclusions

- TCP/IP has a higher bandwidth than VTAM even though TCP/IP has more components to go through (i.e. local and remote SCIs and IMS Connects)
- In the zOS communications server, TCP/IP uses considerable less resources than VTAM. This is believed to be due to a simpler routing technique and less layering
- IMS Connect and SCI have good performance



Performance Evaluations:
IMS Version 12 Fast Path Secondary Index (FPSI)

IMS Version 12 Fast Path Secondary Index (FPSI)

- FP Secondary Index support provides the infrastructure to enable secondary indexing support for IMS FP data entry databases (DEDBs)
- Allows FP DEDBs to be accessed through secondary key sequence
- IMS automatically performs index maintenance
- Hierarchical indexed sequential access method (HISAM) and simple hierarchical indexed sequential access method (SHISAM) database structures are supported

IMS Version 12 Fast Path Secondary Index (FPSI)

- **Scenario 1** compares when Fast Path Secondary Indexes are defined to a database but not used to determine the performance impact
  - With FPSI defined but not used, there is no significant performance impact

	DEDB with 0 secondary indexes	DEDB with 2 secondary indexes	DEDB with 4 secondary indexes
ETR (UTI=50)	265	265	265
CPU	14.2%	15.3%	15.6%
ITR	1866	1732	1699
Proc. Tm (sec)	.012	.011	.012
DLI Stats. (per second)			
GHU	529 (2.33%)	529 (2.33%)	529 (2.33%)
GHN	10,584 (46.51%)	10,584 (46.51%)	10,585 (46.51%)
REPL	11,113 (48.84%)	11,113 (48.84%)	11,114 (48.84%)

Fast Path Secondary Index (FPSI) Impact Analysis

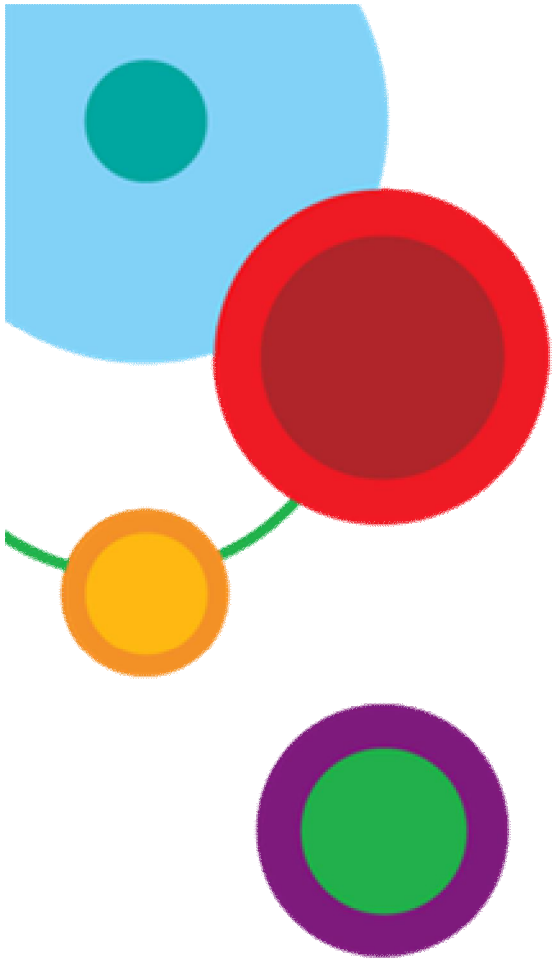
IMS Version 12 FPSI DEDB vs HDAM

- **Scenario 2** compares DEDB with 2 secondary indexes with HDAM databases with 2 secondary indexes

IMS Version 12 FPSI DEDB vs HDAM

	HDAM with 2 secondary indexes	DEDB with 2 secondary indexes	Delta
CPU	34%	19%	-15% (-44%)
ITR	1547	2479	+932 (+60%)
I/O Activity (per second)			
Main DB	6542	3693	
Secidx-1	156	136	
Secidx-2	157	135	
DLI Stats. (per second)			
GHU	1,168 (4.47%)	1,006 (4.67%)	
GHN	11,625 (44.53%)	10,398 (44.43%)	
ISRT	29 (0.11%)	25 (0.11%)	
DLET	30 (0.11%)	27 (0.12%)	
REPL	12,206 (46.75%)	10,917 (46.83%)	

Fast Path Secondary Index (FPSI) Comparing HDAM vs DEDB both with 2 secondary indices



Performance Evaluations:
IMS V12 OTMA ACEE Reduction

IMS V12 OTMA ACEE Reduction

- OTMA Access Control Environment Element (ACEE) enhancements reduce the ACEE storage needed to run IMS and provide a better security environment for running OTMA transactions

OTMA ACEE Reduction 3K TCP/IP Clients

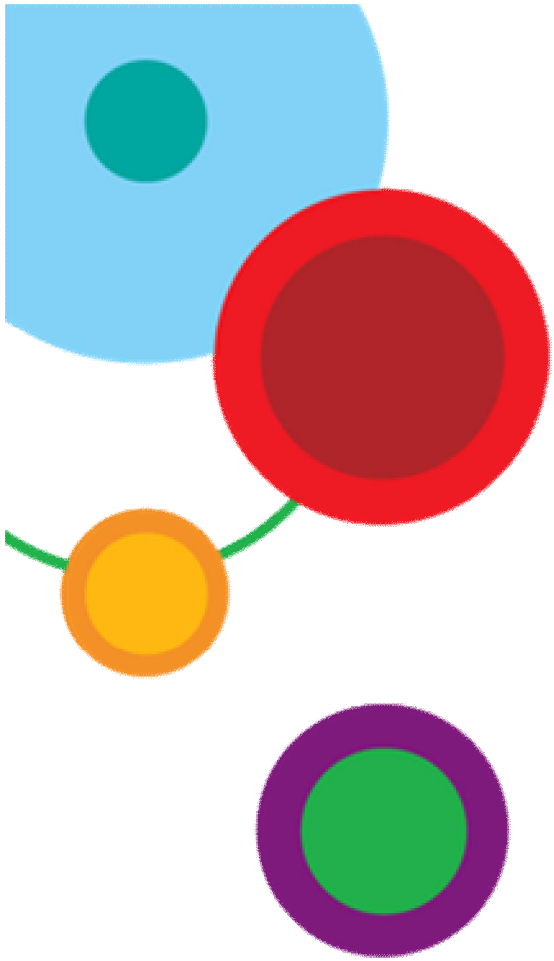
3K TCP/IP Clients	IMS V11	IMS V12	Delta
CPU	73%	73%	--
ITR	17,532	17,539	--
SUBPOOL 249 (MB)	6.8	1.9	-4.9 (72%)
# of ACEEs	9,000	3,000	-6,000

OTMA ACEE Reduction 10K TCP/IP Clients

10K TCP/IP Clients	IMS V11	IMS V12	Delta
CPU	73%	73%	
ITR	17,542	17,539	
SUBPOOL 249 (MB)	22.5	6.7	-15.8 (70%)
# of ACEEs	30,000	10,000	-20,000

IMS V12 OTMA ACEE Reduction

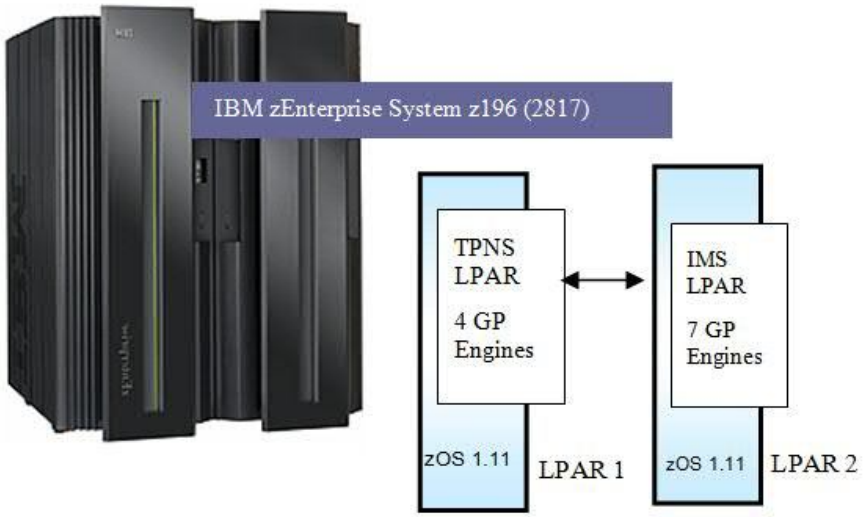
- Expect significantly reduced EPVT usage for the IMS control region when many TMEMBERs have the same user IDs
  - Observed 70% EPVT subpool 249 reduction for IMS V12 over IMS V11
  - Greater EPVT subpool 249 savings is expected as the number of OTMA clients increase



Performance Evaluations:
IMS V12 Fast Path High Volume Benchmark

IMS V12 Fast Path High Volume Benchmark

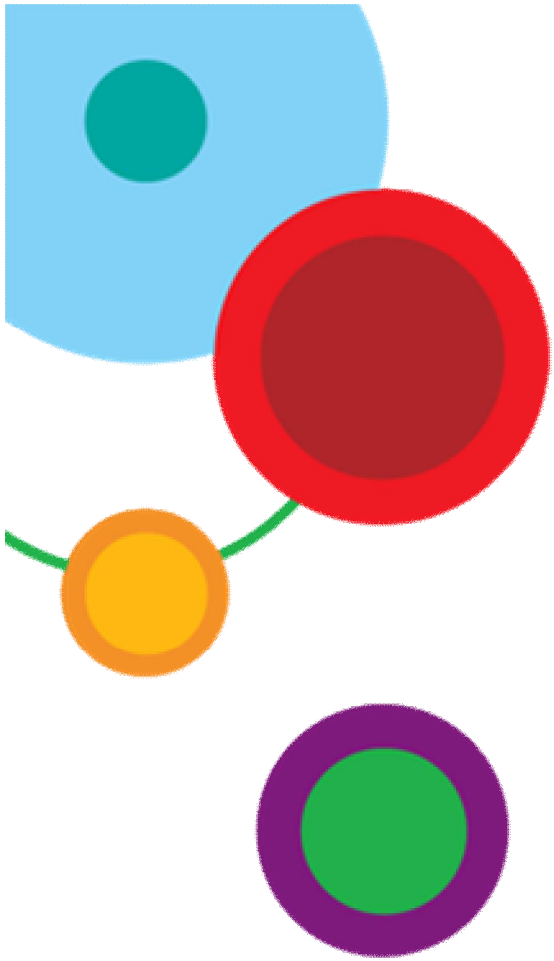
- Environment
  - IBM zEnterprise System z196 (2817)
  - Single IMS LPAR with 7 general purpose processors driven from a separate TPNS LPAR with 4 general processors
  - 48 active IMS Fast Path (IFP) Regions
  - 30,000 terminals - (Terminal Network is simulated by executing TPNS using SNA protocol on separate processors)
  - VTAM internal trace disabled



IMS V12 Fast Path High Volume Benchmark

- Observations

Single Image IMS V12 Fast Path High Stress	
ETR	46,004
CPU Busy %	74.88%
ITR	61,437



IMS Performance Evaluation Highlights

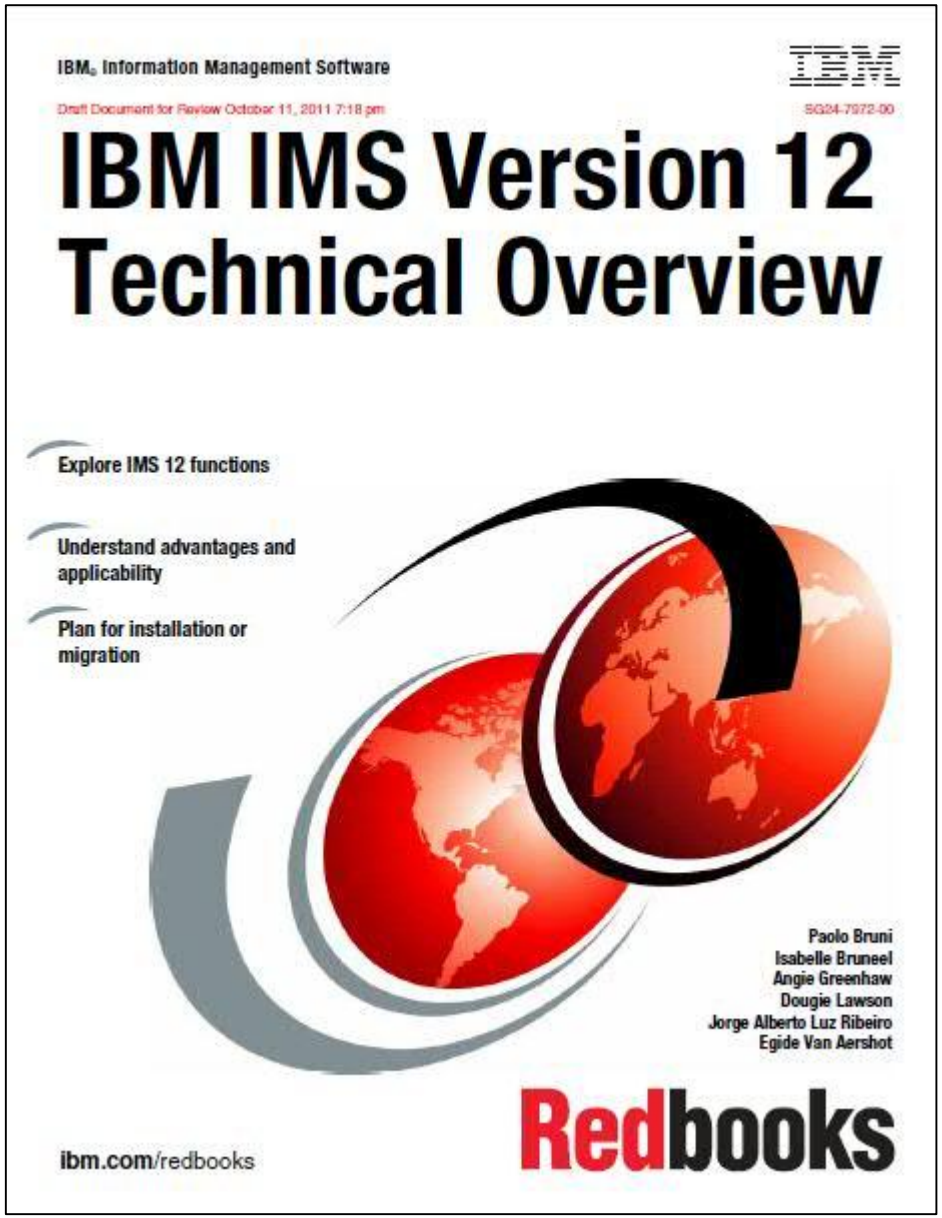
IMS Performance Evaluation Highlights

- Customers migrating from IMS V11 to IMS V12 should expect equivalent performance in some cases and significant improvements in others depending on the environment
- IMS V12 approaches 4 billion transactions a day, achieving over 46,000 transactions per second in a single image Fast Path environment
- 40-50% ITR improvement (CPU efficiency) with IMS V12 APPC/OTMA Synchronous Shared Queues Enhancement with XCF when compared with the same environments using RRS
- 60% ITR improvement was demonstrated for IMS V12 DEDB with (FPSI) over the equivalent workload using HDAM data base with 2 secondary indices

IMS Performance Evaluation Highlights

- Logging rates over 350 MB/sec were achieved using the IMS V12 Logger with 64-bit virtual buffering and Sequential Access Method (SAM) striping
- Virtual Storage Constraint Relief, (VSCR) – IMS V12 demonstrated significant ECSA savings, in our sample 64MB, with the use of 64-bit log buffers
- Customers that are logging bandwidth constrained can significantly improve transaction throughput rates and can reduce their batch time (BMP) windows, we have observed gains of twice the throughput in our environment
- Device response time reduced by up to 10% with the enhanced channel program for the IMS V12 WADS devices in comparison to IMS V11 WADS response time rates
- IMS V12 MSC TCPIP Achieves over 10,500 Transactions per second as baseline benchmark number
- Negligible increased processing cost for all the base function measurements

IMS 12 Redbook Announcement

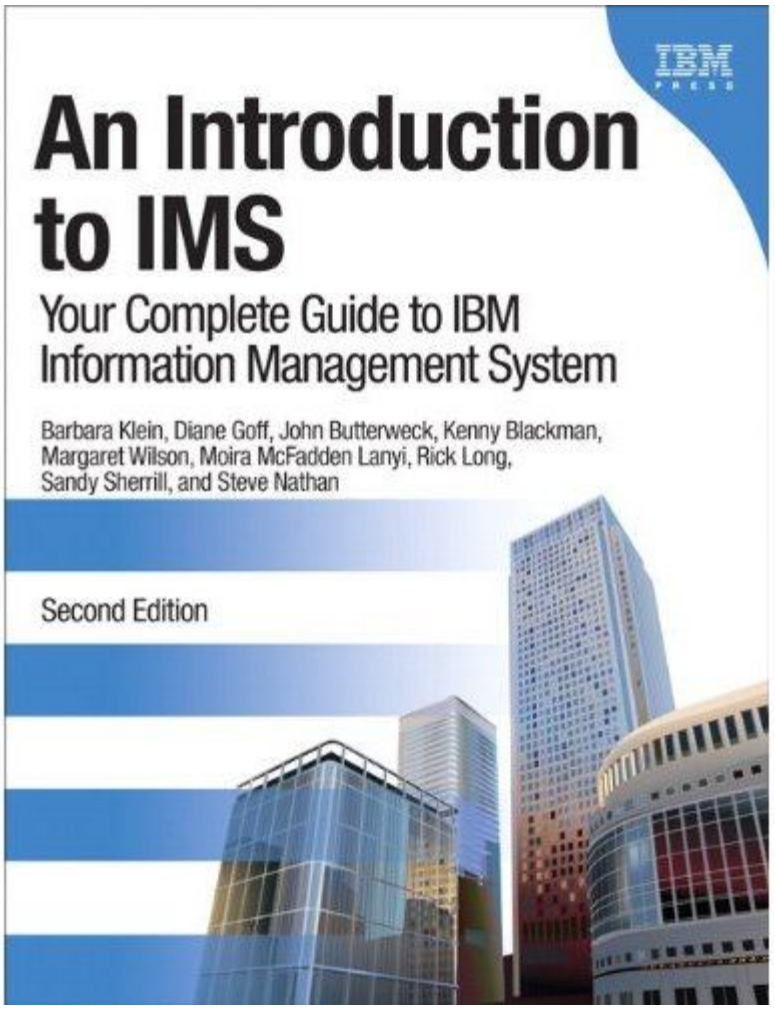


- Just released!
- Discusses all IMS 12 capabilities from a user perspective
- Draft available for free download at http://www.redbooks.ibm.com

An Introduction to IMS – Second Edition

- Updated to include IMS 10, IMS 11 and IMS 12 functions
- Available for pre-order
- Will ship December 2011

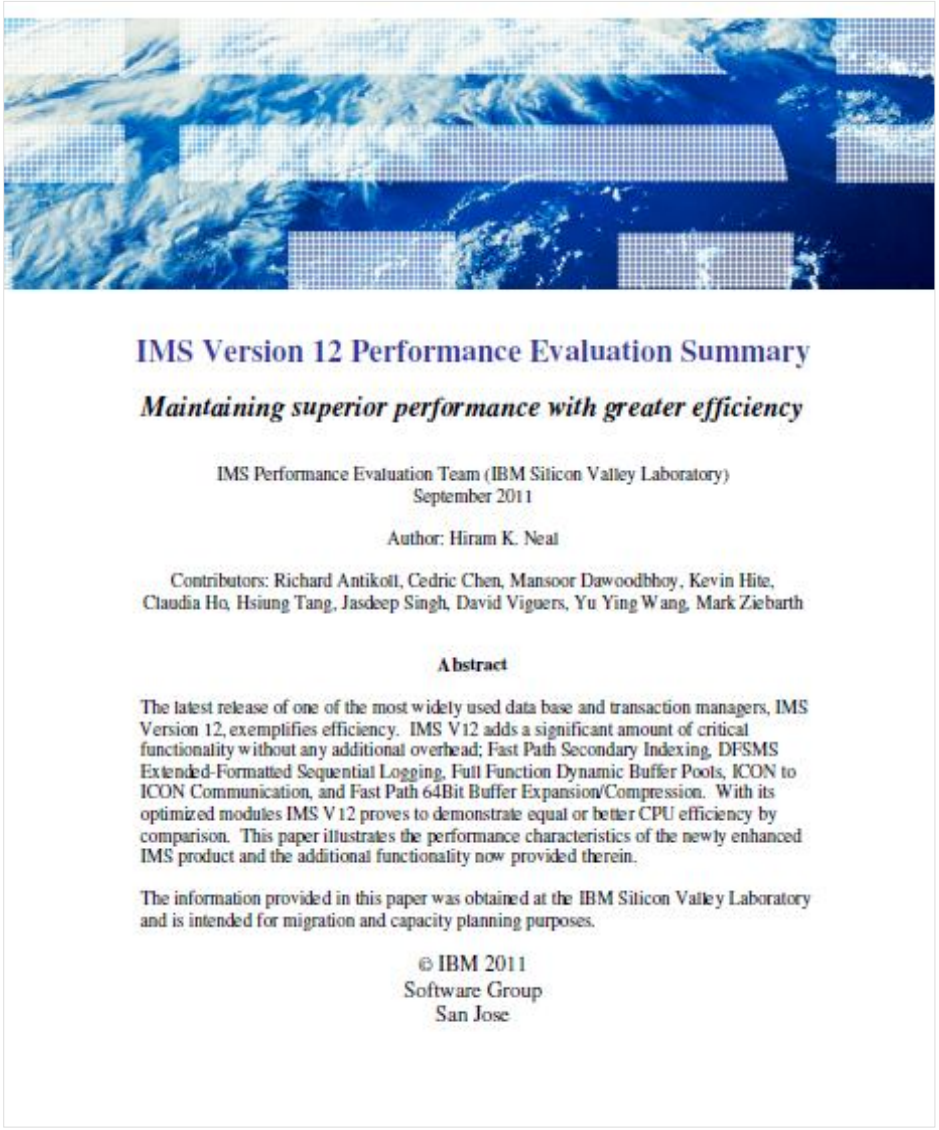
amazon



IMS 12 Performance White Paper is Available

- Detailed results of our internal performance tests
- Environment, functions tested, MIPS and throughput results
- Available for download at

  www.ibm.com/ims



IMS Version 12 Performance Evaluation Summary

Maintaining superior performance with greater efficiency

IMS Performance Evaluation Team (IBM Silicon Valley Laboratory)
September 2011

Author: Hiram K. Neal

Contributors: Richard Antikoll, Cedric Chen, Mansoor Dawoodbhoy, Kevin Hite, Claudia Ho, Hsiung Tang, Jasdeep Singh, David Viguers, Yu Ying Wang, Mark Ziebarth

Abstract

The latest release of one of the most widely used data base and transaction managers, IMS Version 12, exemplifies efficiency. IMS V12 adds a significant amount of critical functionality without any additional overhead; Fast Path Secondary Indexing, DFSMS Extended-Formatted Sequential Logging, Full Function Dynamic Buffer Pools, ICON to ICON Communication, and Fast Path 64Bit Buffer Expansion/Compression. With its optimized modules IMS V12 proves to demonstrate equal or better CPU efficiency by comparison. This paper illustrates the performance characteristics of the newly enhanced IMS product and the additional functionality now provided therein.

The information provided in this paper was obtained at the IBM Silicon Valley Laboratory and is intended for migration and capacity planning purposes.

Software Group
San Jose

Thank You for Joining Us today!

Go to **www.ibm.com/software/systemz/events/calendar** to:

- Replay this teleconference
- Replay previously broadcast teleconferences
- Register for upcoming events